Western Greenbrier Co-Production Demonstration Project

Participant
Western Greenbrier Co-Generation, LLC

Additional Team Members
Alstom Power, Inc.—technology supplier

Hazen Research, Inc.—technology supplier

Parsons E&C—turn-key constructor

Hazen Research Labs—Technology Supplier

Midway Environmental Associates—Technology Supplier

Location
Rainelle, Greenbrier County, West Virginia

Technology
Alstom Power fluidized-bed combustion and WoodBrik™ technology

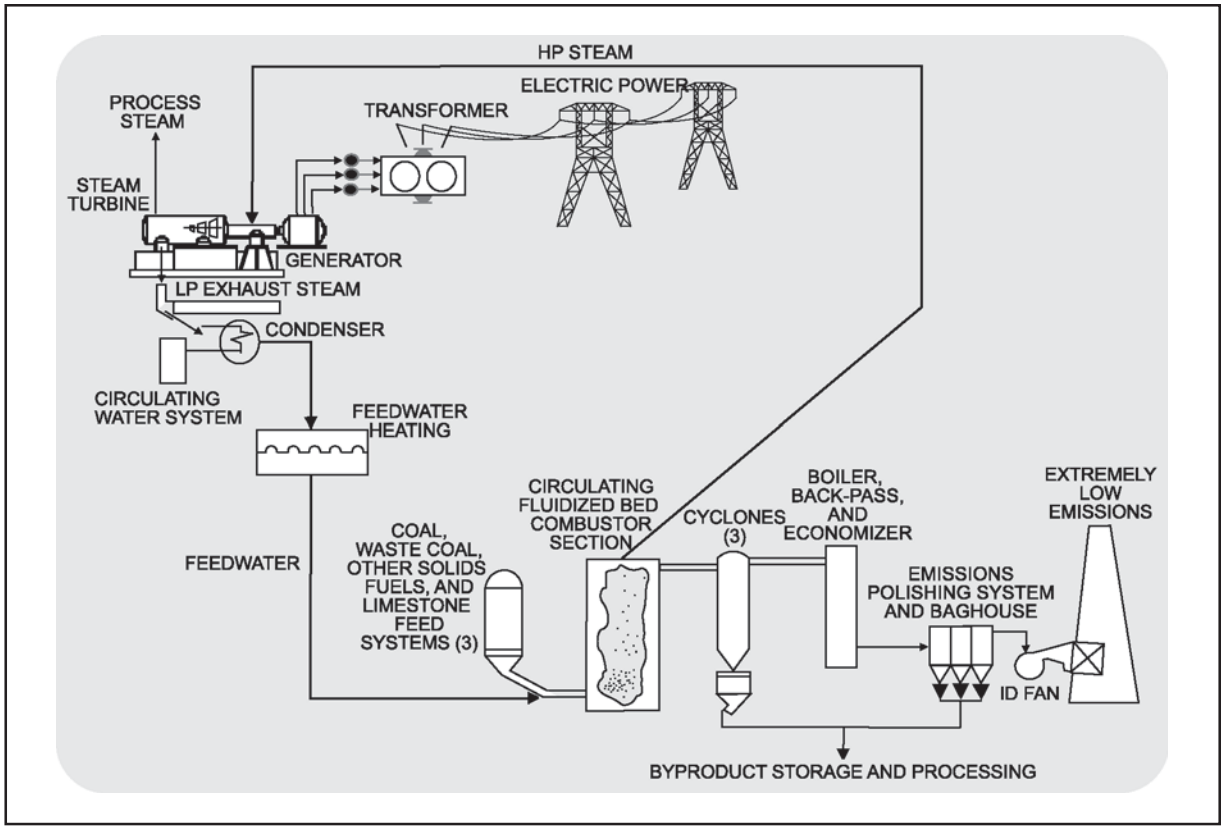
Project Capacity/Production
85 MW and structural bricks

Coal
Bituminous waste

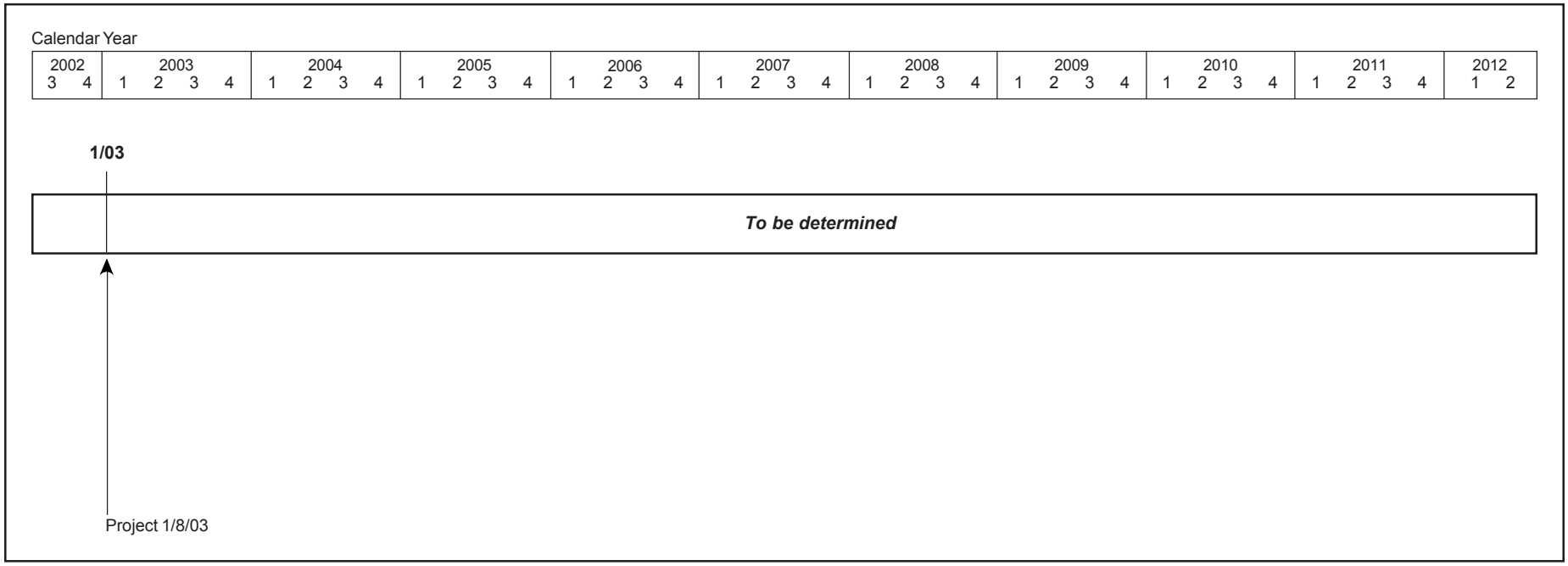
Project Funding

Total	$215,000,000	100%
DOE Share	$107,500,000	50
Participant	$107,500,000	50

Project Objective
To demonstrate integrated co-production of 85 MW of power and simultaneous manufacture of structural bricks certified to meet insulation and load-bearing specification requirements, or to produce Class "C" fly ash for concrete applications.



Technology/Project Description
The co-generating power plant uses a novel circulating fluidized bed combustion (CFB) type of boiler incorporating an inverted cyclone to raise steam to power a conventional steam turbine generator. The CFB boiler island is expected to allow a 30–40% smaller footprint, and reduction in steel tonnage by up to 60% as compared to a conventional CFB system. The plant will burn waste coal from a 4 million ton waste coal pile at Anjean and other regional sources. Ash produced from the coal combustion is divided into two streams. Bottom ash and a small portion of the fly ash is collected and returned to the waste coal pile. The mildly alkaline nature of the ash assists in neutralizing the acid runoff from the wastepile, thus alleviating a significant environmental problem. Most of the fly ash is calcined in a kiln, with added limestone, to convert it to a chemical and physical form that renders it useful for production of structural building products or Class "C" fly ash for concrete applications. A particular patented product, Woodbrik™, has been selected for co-production at the Western Greenbrier Co-Generation facility. The Woodbrik™ is manufactured from converted ash and wood waste into building blocks. The power plant is envisioned to be an anchor tenant in a planned environmentally balanced industrial park (Eco-Park), which will build on the synergistic relationship to the clean-coal power generation system. Steam generated in the boiler or heat from the power plant closed loop cooling system would be used to supply other tenants in the Eco-Park.



Project Status/Accomplishments

The project was selected for award on January 8, 2003. Negotiations are currently underway. The cooperative agreement is expected to be awarded late-2003. The project is expected to last less than two years.

Commercial Applications

A primary benefit of this project is the application of clean coal technologies to improve industrial ecology by employing advanced multi-pollutant control systems, addressing environmental remediation of coal wastes, and using coal, coal wastes and by-products to produce power, process heat and other industrial products. This project offers a unique integration of technologies to convert 1,610 tons/day of coal waste materials that resulted from past mining operations, commonly referred to as "gob," and 220 tons/day of freshly mined coal, into 75 MW of electricity, 20,000 pounds/hour of steam for industrial use and district heating, 300 tons/day of structural bricks and 970 tons/day of alkaline ash material suitable for use in remediating acid mine drainage. If successful, this technology and integrated approach could be applied to many regions of the country to reclaim contaminated land where waste coal is currently stockpiled and to significantly reduce waste disposal activities from operating coal mines. For example, West Virginia alone contains about 400 million tons of waste coal. The advanced compact CFB power plant incorporates SO_x, NO_x, particulate, and mercury missions controls and reduces the standard "footprint" of such plants by 40%. The compact nature of the new system will also reduce structural steel and related construction costs for the boiler system by up to 60%. In addition, the simplified construction process planned for the boiler is expected to result in safer construction practices and a shortened construction time. Employing a Rankine steam cycle for energy conversion (thermal to electricity), this boiler's targeted reheat steam cycle configuration (1,800 psig/1,000 °F/1,000 °F) is deemed aggressive for a power plant of this size, particularly one that uses waste feedstocks. This plant attempts to maximize power generation efficiency, reduce CO_2 emissions, and conserve water resources, while co-producing steam for commercial and industrial uses.

Aside from the novel power plant design, the project will convert coal waste and other refuse into valuable products, including the production of 75 MW of electricity, alkaline ash for environmental remediation, steam for industrial uses (hardwood drying) and district heating, and co-production of structural bricks. This demonstration will also result in high-quality, long-term employment at the power plant and the related "Eco-Park." Successful integration of these technologies and the development of this facility can serve as a model for other state and local governments interested in remediating similar refuse sites in the United States and abroad.